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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/452,691	12/02/1999	FRED D. BAILEY	TI-27935	1638
23494	7590	09/22/2004	EXAMINER	
TEXAS INSTRUMENTS INCORPORATED P O BOX 655474, M/S 3999 DALLAS, TX 75265			FENTY, JESSE A	
			ART UNIT	PAPER NUMBER
			2815	

DATE MAILED: 09/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/452,691

Applicant(s)

BAILEY ET AL.

Examiner

Jesse A. Fenty

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 July 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3, 6-8 and 19-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 21 and 22 is/are allowed.
- 6) ☒ Claim(s) 1, 3, 6-8 and 19 is/are rejected.
- 7) ☒ Claim(s) 2, 20 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION***Drawings***

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the thin film resistor embedded within the multi-level dielectric layer between said first metal interconnect layer and said second metal interconnect layer such that said multi-level dielectric layer separates said thin film resistor from both said first metal interconnect layer and said second metal interconnect layer (of claim 19) must be shown or the feature canceled from the claim. On the contrary, the drawing figures show the resistor (60) below the upper interconnect (100), but not above the lower interconnect (40). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified

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and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 3 and 19 are rejected under 35 U.S.C. 102(e) as being anticipated by Ishikawa et al. (U.S. Patent No. 5,751,050).

In re claims 1 and 19, Ishikawa (Fig. 8) discloses a semiconductor device, comprising:

A lower metal interconnect layer (81) located over a semiconductor body (70);

A multi-level dielectric (71, 76) layer located over said lower interconnect layer;

An upper metal interconnect layer (82) located over said multi-level dielectric layer; and

A thin film resistor (73) embedded within said multi-level dielectric layer between said lower metal interconnect layer and said upper metal interconnect layer, wherein said thin film resistor comprises a resistor layer that is physically separated, in its entirety, in a vertical direction from any metal interconnect layer.

In re claim 3, Ishikawa discloses the device of claim 1, wherein said thin film resistor comprises a hard mask (76) located over an end of the thin film resistor. Note that Ishikawa denotes the layer (76) as a silicon oxide, but does not expressly explain that said layer could be a

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hard mask. Shen et al. (U.S. Patent No. 6,627,971 B1) is included here as a teaching reference to show that silicon oxide (14) has specific use as a hard mask (Shen; column 3, lines 3-4).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishikawa as applied to claim 1 above, and further in view of Redford et al. (U.S. Patent No. 6,081,014).

In re claim 6-8, Ishikawa discloses the device of claim 1, but does not expressly disclose the thin-film resistor comprising TaN, SiCr or NiCr. Redford discloses the use of thin-film resistor materials including polysilicon, silicon chrome, nichrome and tantalum (column 1, lines 23-28). It would have been obvious for one skilled in the art to use silicon chrome, nichrome, or tantalum as disclosed by Redford for the resistor structure of Ishikawa for the purpose, for example, of enhancing the performance of the resistor based on its resistance, tolerance, or TCR (Redford, column 1, lines 29-35).

Allowable Subject Matter

5. Claims 21 and 22 are allowed.

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6. Claims 2 and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

7. Applicant's arguments filed 07/07/04 have been fully considered but they are not persuasive.

In re claims 1 and 19, Applicant argues that the resistor (73) disclosed by Ishigawa is not located between a lower and an upper metal interconnect layer as required by the claim. This claim is met by broadly interpreting the claim language in view of the prior art. The bottom of the lower interconnect (81), the resistor layer (73) and the upper interconnect (82) all lie along different horizontal planes. When seen this way, the resistor layer (73) can be seen to lie “between” the upper and lower interconnect layers. This is a similar interpretation that one obtains from studying Applicant’s Fig. 1. The resistor (60) is not directly above the lower interconnect (40). Rather, the resistor (60) lies “between” the two layers of interconnect only in the broadest sense.

In re claims 2 and 20, Applicant’s arguments are persuasive.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jesse A. Fenty whose telephone number is 571-272-1729. The examiner can normally be reached on 5/4-9 1st Fri. Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 571-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


TOM THOMAS
SUPERVISORY PATENT EX.
TECHNOLOGY CENTER 2800

Jesse A. Fenty
Examiner
Art Unit 2815